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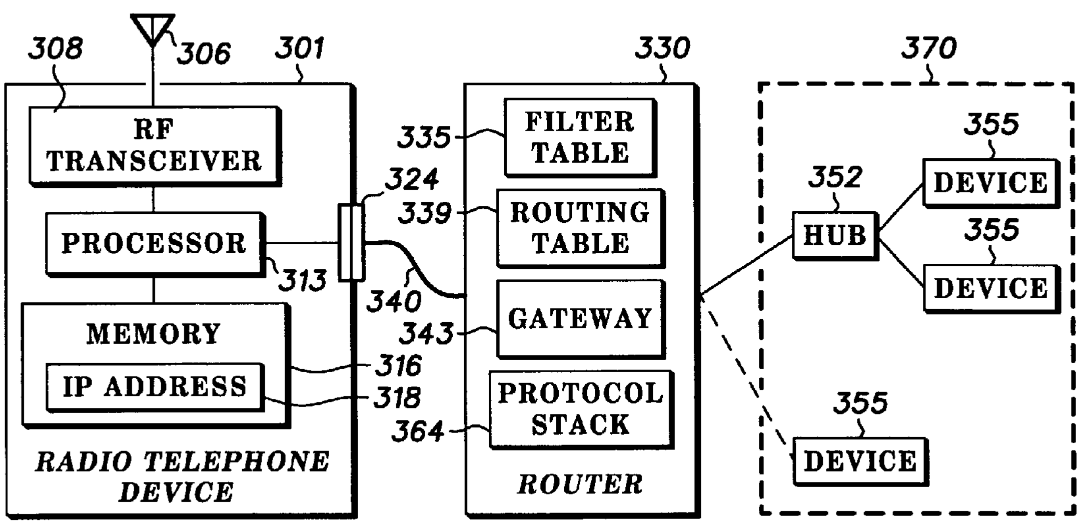
(54) **Title:** CELLULAR PHONE ETHERNET INTERFACE WITH ROUTING CAPABILITY



(57) **Abstract:** A radiotelephone system and method are provided for communicating digital data between an external computer environment (370) connected to a radiotelephone device (112, 301, 400) and a radiotelephone communication network (500). The radiotelephone system includes a radiotelephone device (112, 301, 400) capable of communicating with the radiotelephone communication network (500). The radiotelephone communication network (500) includes a base station controller (506) capable of converting digital data from the radiotelephone device (112, 301, 400) into a computer network digital packet data. The radiotelephone system further includes an Ethernet router (330, 431) communicating with the radiotelephone device (112, 301, 400). The Ethernet router (330, 431) is capable of being connected to the external computer environment (370) and is further capable of communicating the digital data between the external computer environment (370) and the radiotelephone communication network (500).

WO 02/17599 A2

CELLULAR PHONE ETHERNET INTERFACE WITH ROUTING CAPABILITY

FIELD OF THE INVENTION

The present invention relates generally to a radiotelephone system for communicating digital data between a computer environment connected to a radiotelephone device and other data processing devices via a radiotelephone communication network, and more particularly to a radiotelephone device employing an Ethernet router for communicating digital data between the computer and the radiotelephone communication network.

BACKGROUND OF THE INVENTION

Digital communications involve the use of electronic devices to send and receive digital data. One example is a computer network, such as, for example, a local area network (LAN), a wide area network (WAN), a virtual private network (VPN), or a distributed electronic network comprising interconnected networks, such as the Internet. Due to their power, convenience, and widespread availability, such computer networks are very popular.

Typically, computer networks have used telephone lines or other wires to connect various computers and computer networks. This allows geographically separate computers to communicate with each other, enabling users to communicate and to access data from all over the globe. However, the need for a physical wire or line is a major liability, typically limiting digital data communications to fixed locations and stationary computers.

Wireless devices are growing in popularity as a way to send and receive digital data using radio frequency (RF) signals. This has been done with wireless modems that mimic traditional telephone modems. Typically the wireless modem is an interface that combines wireless commands with typical modem commands and relays data through the wireless network to a conventional telephone land line.

Because the wireless modem mimics the operation of a typical telephone (wire) modem, it incorporates many of the drawbacks of the telephone modem.

Telephone (wire) modems typically have a maximum data rate on the order of 230 kilobits per second (Kbits). The Bluetooth RF based wireless protocol allows data transfer of up to 1 megabits per second (Mbits) for a throughput of about 722 Kbits.

This is in striking contrast to the need for high data throughput. Nowhere is this more evident than in video transmission. The MPEG-2 video standard requires 2 Mbits of throughput. High Definition television (HDTV) will need from 30 Mbits to 48 Mbits of throughput.

What is needed, therefore, is an improved data transfer throughput in a radiotelephone network.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a typical cellular telephone network for use with the present invention;

FIG. 2 shows a typical digital computer network;

FIG. 3 shows a first embodiment of a radiotelephone system capable of transferring digital data between an external computer environment and a radiotelephone communication network according to the invention;

FIG. 4 shows a second embodiment of a radiotelephone system according to the invention;

FIG. 5 shows a complex network formed of communications networks of varying types applicable to the invention; and

FIG. 6 shows a flow chart of a method of using a radiotelephone device for communicating data between an external computer environment and a radiotelephone communication network using an Ethernet router, according to one aspect of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A radiotelephone network is a network used for mobile communications. Several types of radiotelephone networks exist, such as, for example, cellular telephone networks, satellite telephone networks, and pager networks. A typical radiotelephone network includes a number of base stations that transmit and receive radio frequency (RF) signals to and from mobile stations, such as cell phones. The radiotelephone network is typically connected to a public switched telephone network (PSTN) via a telephone land line. The land-based communication segments allow geographically separated users to communicate while allowing users to remain mobile. The dedicated land line therefore allows users to communicate using both wire and wireless links. Alternatively, in a satellite network, a satellite wireless link may be used to communicate between users.

FIG. 1 shows a typical cellular telephone network 100 for use with the present invention.. The network 100 includes one or more mobile switching centers (MSCs) 103 that may be interconnected by a public switched telephone network (PSTN) 101. The PSTN 101 is used when a mobile station 112 needs to communicate outside of the geographical area provided by the MSC 103. The MSC 103 also communicates with one or more base site controllers (BSCs) 106. Each BSC 106 communicates with one or more base transceiver stations (BTSs) 110. The BTSs 110 are the RF transceivers that establish the RF links with mobile stations. Each BSC 106 may therefore supervise a plurality of BTSs 110, with a BTS (or a BTS sector as defined by a sectorized antenna) forming a cell of the cellular network 100. A mobile station 112 may therefore communicate with a second radiotelephone device, fixed or mobile. The second radiotelephone device may be communicating over the PSTN 101, may be located at a BTS 110 served by the same BSC 106 or MSC 103, or may be located at a BTS 110' served by a remote BSC 106' or MSC 103'.

In an alternative embodiment, one or more satellites 116 may communicate with the MSC 103, the BSC 106 and/or the mobile station 112, and may serve as the link between geographically separated users.

The mobile station 112 of the network 100 may be a cellular radiotelephone, a satellite radiotelephone, or a pager device, for example.

The radiotelephone network 100 may be a cellular network of any type of communication protocol, such as, for example, GSM, EDGE, etc. In addition, the radiotelephone network 100 may use any type of signal format, such as TDMA, CDMA, etc.

In use, the mobile station 112 establishes a connection to a BTS 110, which then relays data between the mobile station 112 and the MSC 103. The MSC 103 may be connected directly to a second BSC 106 and associated BTSs 110 (not shown), may be connected to a second MSC 103' (and associated BSC 106' and BTSs 110'), or may relay the data to a traditional telephone switching office over the PSTN 101.

FIG. 2 shows a typical digital computer network 200 for use with the present invention. The computer network 200 comprises interconnected computers, computer devices, or computer peripherals 201. The computer network 200 is typically used in situations where multiple computers and computer devices are in use, such as in a place of business, a library, etc.

Digital data traveling over a digital computer network is usually transmitted in the form of discrete units of data called packets. The use of packets prevents any transmitting device from tying up the network for a long period of time with a large data transfer. Packet data networks generally divide a data transmission into a number of packets that each contain a source address, a destination address, and a sequence number. Each packet is placed on the network and is separately and asynchronously transferred. A packet may pass through multiple networks before reaching a destination network. Once at the destination network, the packet is transmitted to all devices on that network. Each device on the network receives the packet and uses the destination address to determine whether to accept the packet. If the address does not match the address of a particular device, that device simply ignores the packet. The data transmission is complete when all packets are received at the destination and re-assembled in a proper sequence, using the sequence numbers of the packets.

In addition to a computer network, multiple interconnected computer networks are commonly in use. FIG. 2 also shows a second computer network 204 connected to the first computer network 200 via a router 207. The router 207 is a device that, as the name implies, routes packets between networks. The router 207 may be attached to and communicating with two or more computer networks. The router 207 receives a digital data packet containing a destination address and a source address. The router may use the destination address to send data within the network. If the address is not a local address of a device within the network, the router may pass it on to another attached network or to another router 211. In this manner, a packet may be passed through multiple routers until it reaches its destination.

Many different packet data transfer protocols may be used. The protocols that have become widespread are Internet protocols such as the Transmission Control Protocol/Internet Protocol (TCP/IP).

One result of the spread of digital computer networks, including the Internet, is the increasing ability of electronic devices to communicate using networks and network protocols. This has led to many devices being designed to connect to and communicate with devices of varied types. In order to do this, it is necessary that such devices not only communicate but also that each be recognizable as being distinct and unique. This requires that each such device have its own electronic address.

Due to the popularity and widespread use of the Internet, many electronic devices are now being manufactured containing an IP address. An IP address, according to the currently used IPv4 protocol, contains 4 bytes (or 32 bits) of address data. The IP address is divided into two parts; an organization-specific network address and a network-specific device address. The organization-specific network address identifies a particular network, and the network-specific device address identifies a particular device on that network.

The IP address is usually notated as four numbers, ranging from 0 to 255, separated by decimal points or periods. For example, an IP address may appear as 255.255.0.1.

Currently, using the IPv4 protocol, the IP address of a device is dictated by the IP address range of an Internet Service Provider (ISP). However, under the next protocol version, IPv6, a 128 bit address will be available and individual devices can be each assigned a unique, fixed IP address. This will allow each electronic device to have a fixed IP address that uniquely identifies that particular device.

Each packet placed on a network for transmission contains a destination IP address that is used by routers to guide the packet to its destination. Each router therefore contains a router table that tells the router how to route data using the destination IP address in the packet. The devices within an attached network are listed in the router table. In addition, the router table may contain addresses for any other networks attached to the router, or addresses of other routers. If the destination is not listed in the router table, the router may pass the packet on to a default destination, such as another router. Therefore, if the destination is not within the router table, the router passes the packet off to another network until it reaches the network containing the destination address.

Ethernet is a digital transmission protocol that was developed to interconnect LAN-based computer devices. It was designed to be a highly universal electronic transmission protocol with a high data transfer rate. Ethernet typically uses a coaxial cable or twisted pair cable, and may include shielding. The Ethernet standard specifies wiring configurations and electrical signals for data transmission.

FIG. 3 shows a first embodiment of a radiotelephone system 300 capable of transferring digital data between an external computer environment 370 and a radiotelephone communication network according to the invention. The radiotelephone system 300 includes a radiotelephone device 301, an Ethernet router 330 connected to the radiotelephone device 301, and an external computer environment 370 connected to the Ethernet router 330.

The radiotelephone device 301 and the Ethernet router 330 are preferably connected by an Ethernet cable 340, such as a twisted pair cable.

The external computer environment 370 may include a single computer device 355. Alternatively, the external computer environment 370 may include a hub 352

that enables multiple computer devices 355 to be connected to the Ethernet router 330.

A computer device 355 may be any electronic data processing device that is capable of communicating over a digital electronic network. This may include, for example, a computer, a computer peripheral such as a printer, scanner, storage device, etc., a video device such as a video camera or video player, etc.

The radiotelephone device 301 may be any type of radiotelephone device 301, such as, for example, a cellular phone, a satellite phone, a pager, etc. The radiotelephone device 301 further includes an antenna 306, a RF transceiver 308, a processor 313, an external connector 324, and a memory 316.

The RF transceiver 308 transmits and receives RF signals using the antenna 306. The processor 313 controls all functions of the radiotelephone device 301, such as configuring and operating the RF transceiver 308 and accepting inputs from the user, generally through a keypad or keyboard. The memory 316 stores program code and data for use by the processor. The memory 316 may store, for example, an IP address 318 of the radiotelephone device 301. The memory 316 may additionally store phone numbers, etc.

The external connector 324 may be used by the radiotelephone device 301 to connect to the Ethernet router 330 according to one aspect of the present invention. The external connector 324 is preferably an RJ45 jack. A 10BaseT Ethernet connection typically requires an RJ45 connector.

The present invention preferably employs a 10baseT capable Ethernet router, and even more preferably a 100baseT capable router. The number 10 in a specification 10baseT indicates a 10 Mbits Ethernet transceiver, while the 100baseT indicates a 100 Mbits Ethernet transceiver. The T represents a twisted pair Ethernet cable and RJ45 connectors. The twisted pair cable generally gives a higher data transfer rate, and is therefore often preferred for higher-throughput Ethernet applications.

As can be seen from the figure, the Ethernet router 330 in this embodiment is a separate or stand-alone device that connects to the radiotelephone device 301. Using the Ethernet router 330, a radiotelephone device may become a high data rate

transmitter/receiver device. In this manner, a radiotelephone device 301 may be connected to a computer, a laptop, a printer, etc., to establish a high-speed connection.

The Ethernet router 330 includes a routing table 339 that is used by the Ethernet router 330 to transmit packets in either direction. If a packet is being sent by a device 355 in the external computer environment 370, the destination IP address will of course not be local to the Ethernet router 330, and will be passed on to the radiotelephone communication network through the radiotelephone device 301. A packet received from the radiotelephone communication network must be examined to determine if the packet is intended for the external computer environment 370. If so, the Ethernet router 330 must pass the packet on to the particular device 355. If the packet is not intended for the external computer environment 370, the Ethernet router 330 of the present invention may simply drop the packet. The Ethernet router 330 as applied in the present invention does not pass a non-local packet.

The Ethernet router 330 may also include a filter table 335. The filter table 335 may be used by the Ethernet router 330 to determine which packets are relayed. The filter table 335 may be set up to serve as a firewall, limiting which devices or IP addresses external to the radiotelephone system can send data to a device 355 (and vice versa). This may be done for either protection and security purposes, or to limit traffic in the Ethernet router 330 and/or traffic in the external computer environment 370.

In addition, the Ethernet router 330 may also incorporate gateway software 343 and perform a gateway function. A gateway is used to interconnect networks or devices of differing types, and allows an exchange of data between systems that have different structures. A gateway Ethernet router 330 may therefore not only route a packet to a destination, but may also perform some type of protocol or data conversion as needed.

The protocol stack 364 stores protocol variables and data that allow the router to transfer packets of one or more protocols. For example, the radiotelephone device 301 and the Ethernet router 330 may employ an Open Systems Interconnection (OSI) protocol that requires a protocol stack 364. The protocol stack 364 keeps data link functions out of the transport and network layers using very strictly defined

interface/calling procedures between layers. Each layer should function autonomously.

In order to work properly or efficiently, the Ethernet router 330 may need to be configured. This must be done before a first use, and may need to be done periodically in order to keep routing information current. The Ethernet router 330 may be configured by either the radiotelephone device 301, or by an external computer device (see text accompanying step 603 of FIG. 6 for a discussion of the Ethernet router configuration).

FIG. 4 shows a second embodiment of a radiotelephone system 400 capable of communicating digital data between an external computer environment and a radiotelephone communication network. The radiotelephone system 400 includes a radiotelephone device 400 including an integrated Ethernet router. An external computer environment may be connected to the radiotelephone system 400.

In this embodiment, the Ethernet router is implemented by an integrated Ethernet transceiver semiconductor device 431. The Ethernet transceiver 431 is commercially available as an integrated device that may be mounted to an internal circuit board and may be powered by a 3-5 volt power supply. This allows the Ethernet transceiver 431 to be integrated into the radiotelephone device 400 and be powered by the power supply of the radiotelephone device 400. The integrated Ethernet transceiver 431 may be powered down when not in use in order to preserve battery life.

The RF transceiver 408 transmits and receives RF signals using the antenna 406. The processor 413 controls all functions of the radiotelephone device 400, such as configuring and operating the RF transceiver 408 and accepting inputs from the user, generally through a keypad or keyboard. The memory 416 stores program code and data for use by the processor. The memory 416 may store, for example, an IP address 420 of the radiotelephone device 400. The memory 416 may additionally store phone numbers, etc.

The external connector 424 may be used by the radiotelephone device 400 to connect to an external computer environment. The external connector 424 is preferably an RJ45 jack.

The transceiver 431 communicates with a processor 413 and further communicates with an external connector 424. The external connector 424 allows the radiotelephone device 400 to be connected to an external computer environment, such as a LAN or other computer devices. The Ethernet transceiver provides the physical interface between the radiotelephone device 400 and locally connected devices.

As in the first embodiment, the Ethernet router 431 routes traffic between external devices through a radiotelephone communication network.

The advantage of the integrated Ethernet transceiver 431 is that the router is more integrated into the radiotelephone device 400, and therefore is more compact and results in less exposed cabling.

The memory 416 of the radiotelephone device 400 is also used to implement the Ethernet router. The memory 416 may include an IP address 420 of the radiotelephone device 400, a filter table 443, a routing table 447, an optional gateway component 462, and a protocol stack 464. Each of these components perform functions as described in the text accompanying FIG. 3, and may be easily integrated into the memory 416.

FIG. 5 shows a complex communication network 500 formed of communications networks of varying types applicable to the invention. The complex network 500 may include a conventional radiotelephone network, including MSCs, BSCs, and BTSs, may include a PSTN 101, a public data network (PDN) 501 (essentially a switched wire network for packet data), and an IP node 514. The complex network 500 additionally includes a BSC/PCU 506 (packet control unit) capable of directly interfacing with the IP node 514. The IP node 514 may be connected to other networks, such as a conventional cellular network. This may be done through the use of a gateway.

The mobile station 112 may be a radiotelephone device combined with an Ethernet router, according to one of the embodiments of the present invention.

The mobile station 112 is capable of communicating with a number of devices, including a typical cellular base site, including an MSC 103, a BSC 106, and one or more BTSs 110. This communication typically would be a voice communications only. In addition, the mobile station 112 of the present invention

may communicate with the BSC/PCU 506 that is connected to an Internet node 514. This communication may be in the form of voice, data, multimedia, etc. This may occur where the BSC is capable of converting data from a radiotelephone format and protocol into an Internet format and protocol.

FIG. 6 shows a flow chart 600 of a method of using a radiotelephone device for communicating data between an attached external computer environment and a remote data processing device via a radiotelephone communication network using an Ethernet router, according to one embodiment of the present invention. In step 603, the Ethernet router is configured. In a preferred embodiment, an external computer device, such as a laptop computer, for example, is used to configure the Ethernet router. This step may need to be done due to a general lack of a suitable display and graphical user interface in the radiotelephone device. However, the radiotelephone device could be used to configure the Ethernet router using more complex and lengthy button-press combinations. The configuration step will likely need to be performed before a first use of the Ethernet router, and may also be necessary at later intervals to update the routing information.

In step 606, the Ethernet router learns IP addresses, such as an IP address of an associated radiotelephone device. The Ethernet router may determine the fixed end Ethernet addresses (i.e., addresses of devices connected to the radiotelephone network infrastructure). This may be done via the RF link protocol. The IP packets are sent via the radio link protocol(s) used by the radiotelephone network, such as, for example, Code Division Multiple Access (CDMA), Wideband Code Division Multiple Access (WCDMA), Universal Mobile Telecom Services (UMTS), Enhanced Data rates over GSM Evolution (EDGE), General Packet Radio Service (GPRS), etc.

The radiotelephone device may be given a dynamic IP address by the associated router or by the radiotelephone network. The assigned IP address will be a function of the roamed network.

In addition, the Ethernet router may learn the addresses of any device in the connected external computer environment, and may learn the device addresses that have been delivered by the RF link protocol.

The radiotelephone network typically will forward on to the radiotelephone device only packets addressed to that device. However, in an alternative embodiment, all packets could be sent over the air, allowing the radiotelephone device to learn other, additional IP addresses. In addition, the radiotelephone network may support an IP dispatch mode that allows packet transfer between radiotelephone devices.

In step 610, the Ethernet router receives a data communication. The data communication may be traveling either to or from the external computer environment (i.e., either a downlink or an uplink).

In step 614, for a data communication traveling from the external computer environment to the radiotelephone communication network, the data communication may optionally be broken up and encapsulated or packetized into digital data packets in the Ethernet router. The data is preferably not communicated using an Internet protocol, but instead is communicated using a radiotelephone transmission protocol.

In step 625, the Ethernet router determines whether the destination IP address is local, i.e., whether the address is an address of a device connected to the Ethernet router.

In step 639, in applications where a gateway function is needed, the Ethernet router may optionally perform gateway functions. This may include, for example, data and/or protocol conversions.

In step 670, the Ethernet router may optionally perform address filtering. The Ethernet router may be configured so that only known IP addresses may send data to the external computer environment. This may be done in order to maintain security or to reduce traffic levels.

In step 676, the Ethernet router may pass the data on, assuming that none of the above tests failed. In an uplink situation where a computer device 355 is using the radiotelephone device to transmit data to another device over the radiotelephone communication network, the Ethernet router may automatically pass the data on. In a downlink situation where the radiotelephone communication network is transmitting data, the Ethernet router must decide whether the data should be passed on to the external computer environment 370 (in a packet data network, a device commonly receives all transmitted packets but only accepts packets addressed to it). Therefore,

the Ethernet router must determine whether a destination IP address is an address of a device in the external computer environment 370.

While the invention has been described in detail above, the invention is not intended to be limited to the specific embodiments as described. It is evident that those skilled in the art may now make numerous uses and modifications of and departures from the specific embodiments described herein without departing from the inventive concepts.

WHAT IS CLAIMED IS:

1. A radiotelephone system for communicating digital data between an external computer environment connected to a radiotelephone device and another data processing device through a radiotelephone communication network, comprising:

a radiotelephone device capable of communicating with said radiotelephone communication network;

said radiotelephone communication network including a base station controller capable of converting said digital data from said radiotelephone device into computer network digital data packets; and

a network router communicating with said radiotelephone device, with said network router being connected to said external computer environment and being further capable of communicating said digital data between said external computer environment and said radiotelephone device.

2. The radiotelephone system of claim 1, wherein said network router further comprises an Ethernet router.

3. The radiotelephone system of claim 1, wherein said network router further comprises an Ethernet hub capable of connecting a plurality of external devices to said Ethernet cable.

4. The radiotelephone system of claim 1, wherein said network router further comprises an Ethernet router and said Ethernet router is capable of being configured by said external computer environment.

5. The radiotelephone system of claim 1, wherein said network router is integrated into said radiotelephone device.

6. The radiotelephone system of claim 1, wherein said network router filters digital data packet transfer communicated to said external device.

7. The radiotelephone system of claim 1, wherein said external computer environment includes a computer.

8. The radiotelephone system of claim 1, wherein said external computer environment includes a computer peripheral.

9. The radiotelephone system of claim 1, wherein said external device includes a local area network.

10. The radiotelephone system of claim 1, wherein said radiotelephone device comprises a cellular telephone mobile station.

11. The radiotelephone system of claim 1, wherein said network router comprises a 100baseT PCMCIA Ethernet transceiver.

12. The radiotelephone system of claim 1, wherein said network router comprises a 10baseT PCMCIA Ethernet transceiver.

13. A radiotelephone system for communicating digital data between an external computer environment connected to a radiotelephone device and another data processing device through a radiotelephone communication network, comprising:

a radiotelephone device capable of communicating with said radiotelephone communication network; and

a network router communicating with said radiotelephone device, with said network router being connected to said external computer environment and further capable of communicating said digital data between said external computer environment and said radiotelephone communication network.

14. A method of using a radiotelephone device for communicating digital data between an external computer environment and another data processing device through a radiotelephone communication network using an Ethernet router, comprising the steps of:

learning a radiotelephone device IP address of said radiotelephone device and learning local device addresses of local devices connected to said radiotelephone device;

receiving said digital data in a communication between said external computer environment and said radiotelephone communication network, said digital data including a destination IP address;

determining whether said destination IP address is for a local device local to said radiotelephone device, using an Ethernet router in said radiotelephone device; and

passing on said data if said destination IP address is non-local and sending said data to said local device otherwise.

15. The method of claim 14, wherein said method further includes the step of encapsulating said digital data into a packet if said digital data is being transmitted from said external computer environment to said radiotelephone communication network.

16. The method of claim 14, wherein said method further includes the steps of:

comparing said destination IP address to a list of allowed local device addresses; and

passing on said data if said destination IP address is in said list of allowed local device addresses.

17. The method of claim 14, wherein said method further includes the step of configuring said Ethernet router using a connected external computer device.

18. The method of claim 14, wherein said Ethernet router further performs a gateway function between said external computer environment and said radiotelephone communication network.

19. A radiotelephone device for communication of digital data between an external computer environment and a wireless communication network, said radiotelephone device comprising:

a processor being effective to control communication functions of said radiotelephone device;

a wireless transceiver coupled to said processor, said first transceiver being capable of wireless communication with said wireless communication network;

an external connector coupled to said processor, said external connector providing a connection to said external computer environment; and

a memory coupled to said processor, said memory including an IP Address of said radiotelephone device.

20. The radiotelephone device of claim 19, wherein said external computer environment includes a network router for connecting said external connector to a remainder of said external computer environment.

21. The radiotelephone device of claim 20, wherein said network router utilizes Ethernet protocol to communicate said digital data to and from said external computer environment.

22. The radiotelephone device of claim 20, wherein said network router includes a filter table, a routing table, a gateway and a protocol stack.

23. The radiotelephone device of claim 19, wherein said network router provides firewall protection for said external computer environment.

24. The radiotelephone device of claim 19, wherein said network router provides firewall protection for said wireless communication network.

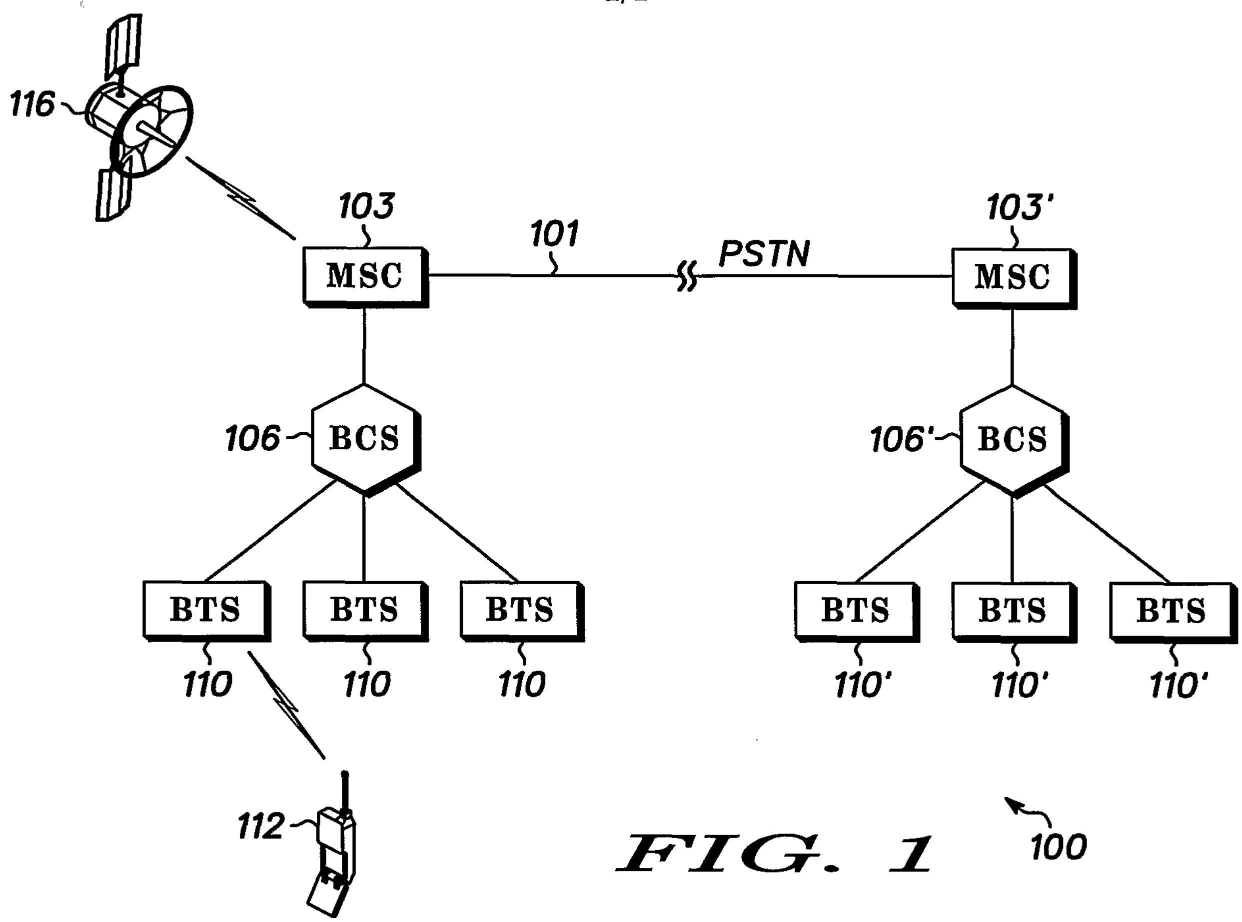
25. The radiotelephone device of claim 19, wherein said memory includes a filter table, a routing table, a gateway and a protocol stack.

26. The radiotelephone system of claim 19, further comprising a network transceiver coupled between said processor and said external connector.

27. The radiotelephone system of claim 26, wherein said network transceiver utilizes Ethernet protocol to communicate said digital data to and from said external computer environment.

28. The radiotelephone system of claim 26, wherein said network transceiver provides firewall protection for said external computer environment.

29. The radiotelephone system of claim 26, wherein said network transceiver provides firewall protection for said wireless communication network.


116
103
101
PSTN
103'
MSC
MSC
106
BCS
106'
BCS
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BTS
BTS
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BTS
BTS
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110
110
110'
110'
110'
112
100

FIG. 1

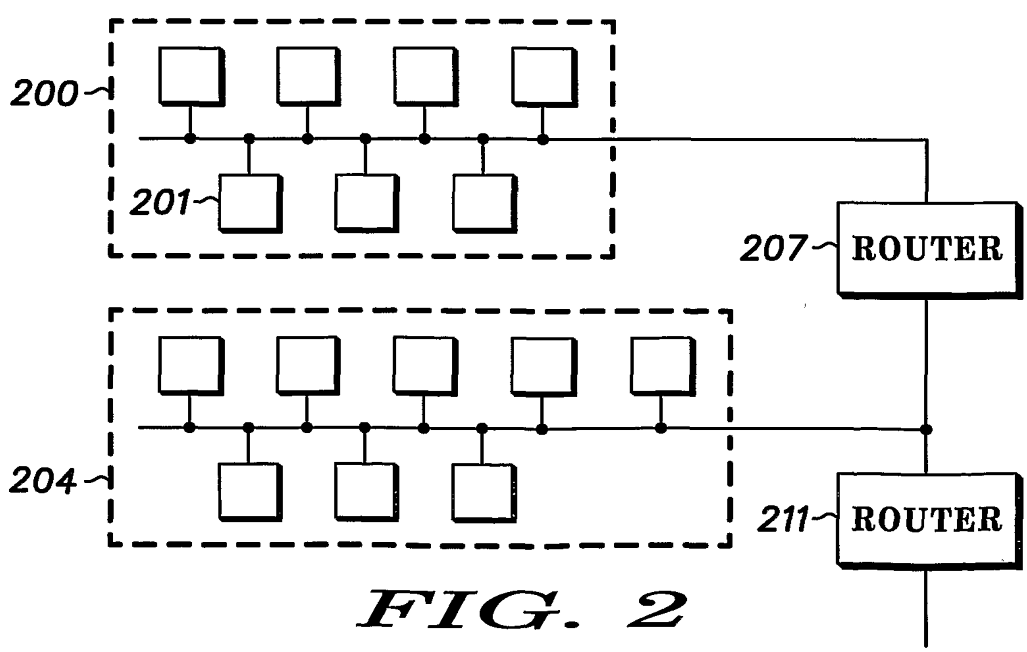
200
201
207
ROUTER
204
211
ROUTER

FIG. 2

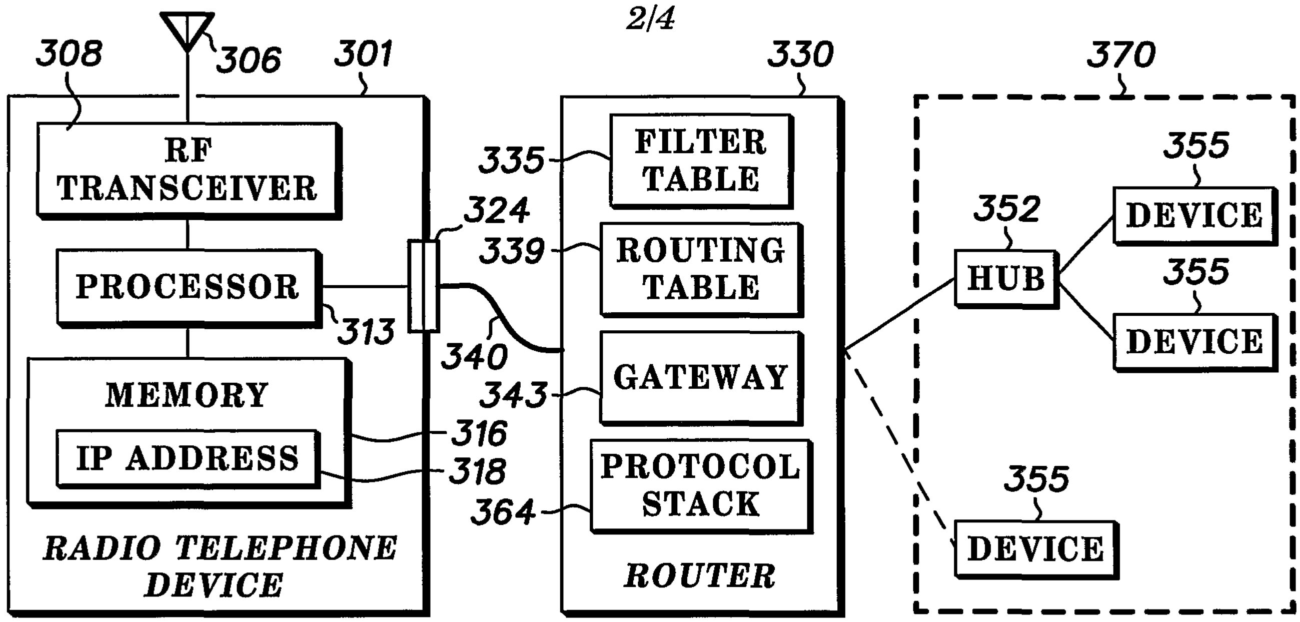

FIG. 3 300

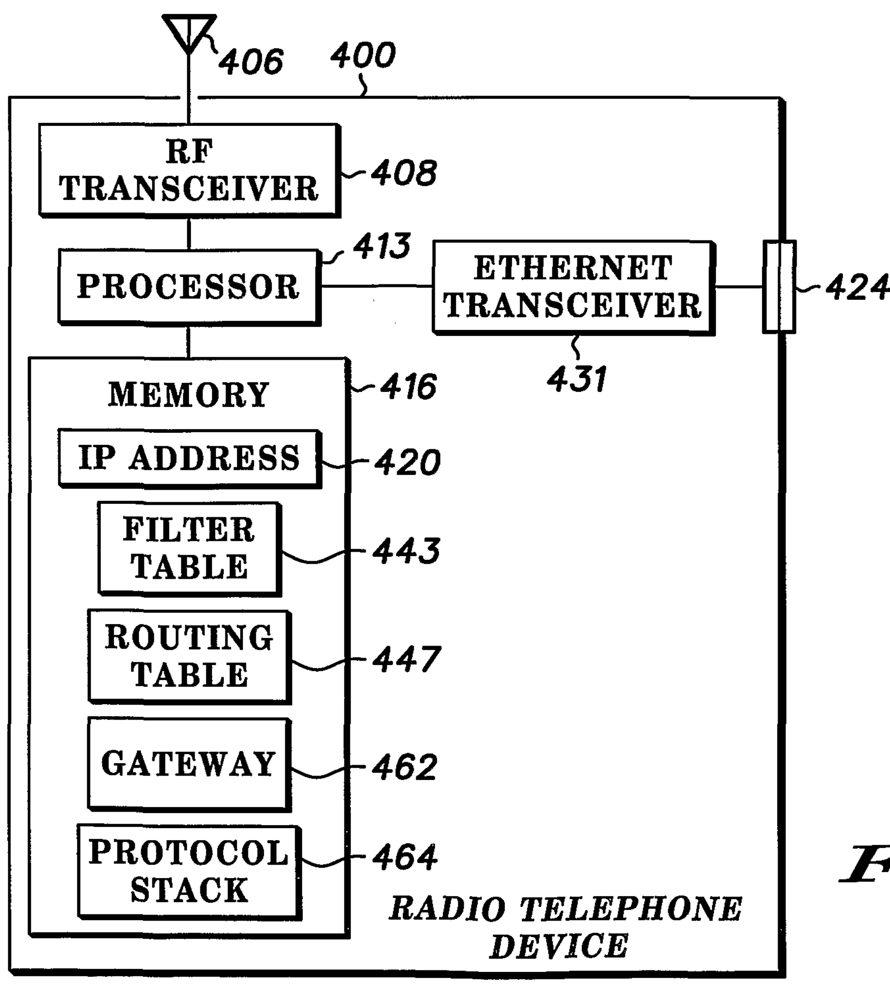

FIG. 4

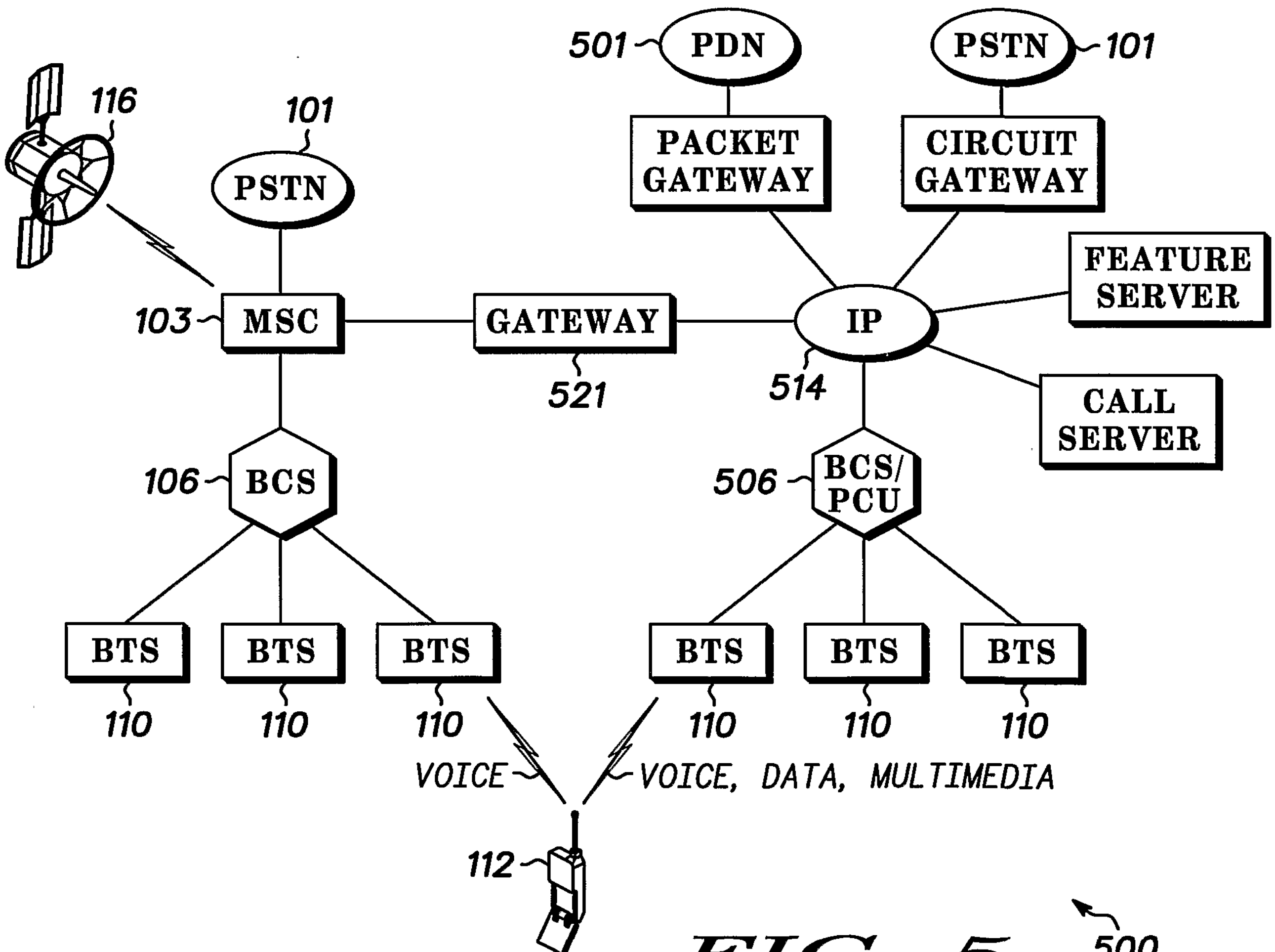
116
101
PSTN
501
PDN
PSTN
101
PACKET GATEWAY
CIRCUIT GATEWAY
FEATURE SERVER
103
MSC
GATEWAY
521
IP
514
CALL SERVER
106
BCS
506
BCS/ PCU
BTS
BTS
BTS
BTS
BTS
BTS
110
110
110
110
110
110
VOICE
VOICE, DATA, MULTIMEDIA
112
500

FIG. 5

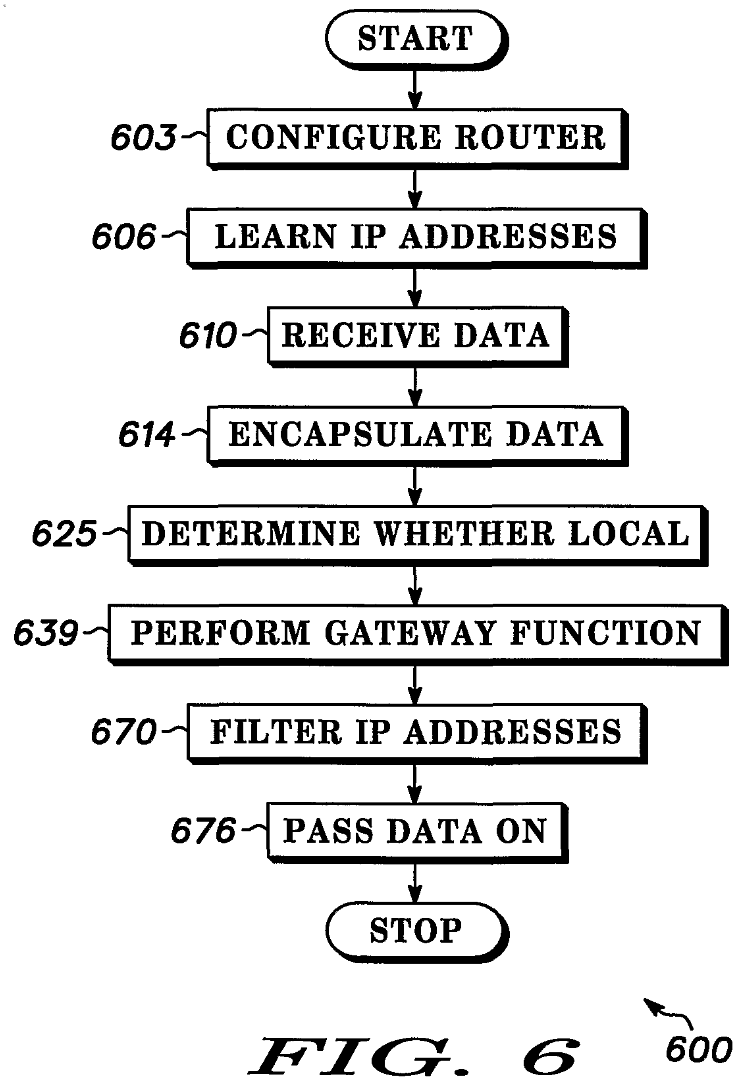
START
603 CONFIGURE ROUTER
606 LEARN IP ADDRESSES
610 RECEIVE DATA
614 ENCAPSULATE DATA
625 DETERMINE WHETHER LOCAL
639 PERFORM GATEWAY FUNCTION
670 FILTER IP ADDRESSES
676 PASS DATA ON
STOP
600

FIG. 6